BRIDGEWATER BRIDGE
TASMANIA

Nomination for
Engineers Australia Engineering Heritage Recognition

Prepared by
Ian D Cooper FIEAust CPEng (Ret)

for

Department of Infrastructure, Tasmania

and

Engineering Heritage Tasmania

April 2018

TABLE OF CONTENTS

PICTURE GALLERY

HERITAGE AWARD NOMINATION FORM

The Administrator
Engineering Heritage Australia
Engineers Australia
Engineering House
11 National Circuit
BARTON ACT 2600

Name of work: Bridgewater Bridge

This work is nominated for an award under the Heritage Recognition Program of Engineers Australia.

Location: Bridgewater Bridge, Bridgewater, Tasmania 7030
Grid Reference $42^{0}44'27''S$, $147^{0}13'31''E$

Owner: Department of State Growth, Tasmania (Minister for Infrastructure)
Level 1 Franklin Square Office, Hobart TAS 7000

The owner has been advised and the letter of agreement is attached.

Access to site: The site can be accessed at Granton on the southern bank of the Derwent River and the Bridgewater Causeway or on the northern bank at Bridgewater. Our expectation is to hold the ceremony and presentation in the car park or playground just west of the 'Watch House' at Granton.

Nominating Body: Engineering Heritage Tasmania

Ian D. COOPER
…….
Chair of Engineering Heritage Tasmania
Date: April 2018

BASIC DATA

Item Name:	Bridgewater Bridge, Tasmania
Other Names:	Bridgewater Causeway
Location:	Derwent River, Bridgewater, Tasmania 7030 Grid Reference 42^{0}44′27″S, 147^{0}13′31″E
Local Govt. Area:	Glenorchy Municipality; Brighton Municipality
Owner:	Department of State Growth, Tasmania (Minister for Infrastructure) Level 1 Franklin Square Office, Hobart TAS 7000
Current Use:	Highway Road Bridge to cross the Derwent River
Former Use:	Highway Road and Railway Bridge
Designers:	* Bridgewater Causeway (1830-36) - Roderick O'Connor was Inspector for Roads and Bridges during its construction * Bridge No1 (1849) was designed by James Thompson and James Blackburn * Bridge No2 (1874) – unknown * Bridge No3 (1893) – unknown * Bridge No4 (1942) was designed by Allan Knight (later Sir Allan Knight) with the assistance of David Issacs, an engineering consultant and welding specialist
Builders:	* Causeway was built by convict labour under the supervision of Raphael Clint * Bridge No1 (1849) – Thomson and Blackburn * Bridge No2 (1874) – Tasmanian Main Line Railway Company * Bridge No3 (1892) – John Wishart and Son * Bridge No4 (1942) – Public Works Department
Year Started:	1830 with construction of the Causeway
Physical Condition:	The current Bridge No4 was completed in 1946 and has been operating for over 70 years. It was refurbished by end of December 2010 and with, regular maintenance, the expectation is a further 15 years of satisfactory operation.
Modification & Dates:	* Causeway construction commenced in 1830 and completed in 1836 * Bridge No1 (1849) – Thomson and Blackburn * Bridge No2 (1874) – Tasmanian Main Line Railway Company * Bridge No3 (1892) – John Wishart and Son * Bridge No4 (1942) – Public Works Department
Heritage Listings:	* Old Watch House at the southern end of the Causeway was convict built and still contains the solitary confinement cell-Tasmanian Heritage Register #1,182 * Bridgewater Bridge-Tasmanian Heritage Register #618

ACCEPTANCE FROM OWNER

LOCATION of BRIDGEWATER CAUSEWAY and BRIDGES

Figure 1 Map of Tasmania

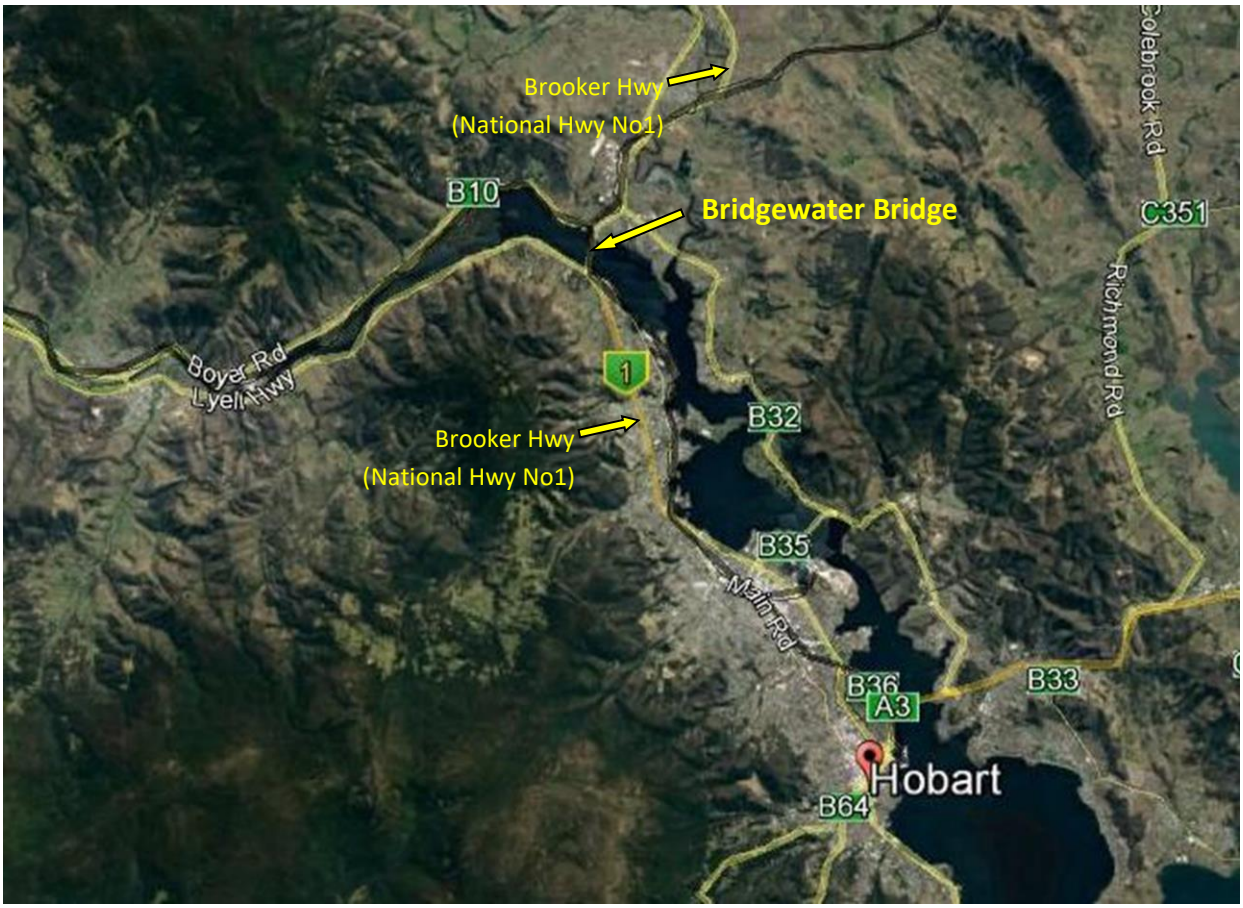


Figure 2 Aerial image showing Derwent River and location of Bridgewater Bridge North West of Hobart

HISTORY of BRIDGEWATER CAUSEWAY and BRIDGES

In early Van Diemen's Land, the only way to span the broad reaches of the Derwent River to reach the northern interior and its fertile pastures was by ferry. As early as 1816, a ferry operated from Austin's Ferry ('Roseneath') to Old Beach on the eastern side and from further upstream in 1821 a ferry operated from Black Snake (Granton), just downstream from where the causeway was to be constructed nine years later. The ferries carried passengers, livestock, goods and vehicles. [Image 2]

In 1818, a tragic incident highlighted the risks of crossing the Derwent when a boat capsized in bad weather and 11 persons drowned. Ferries were dangerous and costly, so in 1826, a committee was appointed to consider a more convenient and safe crossing of the River.

CONVICT BUILT CAUSEWAY

The Committee initially recommended a wooden bridge be built near Black Snake but this was reviewed and the final decision was to construct a causeway, starting on the south side of the river where mud flats extended three quarters of the way across the river. A large quantity of stone (mainly sandstone) was available close by on the southern side of the Derwent. Convict labour was used to quarry the stone and then to cart the stone by wheel barrow. Work began in 1830, using up to 280 convicts at the site.

The causeway was originally 120m long and 17m wide but was further lengthened to 730m and widened to 20m and raised a number of times due to steady subsidence. A large volume of mud was displaced by the mass of rock filling, creating mud banks on either side of the causeway. In 1850, the causeway was estimated to contain 1,800,000 tons of stone and clay and cost the British government £52,000.

In April 1835 Roderick O'Connor submitted a report that weighed the advantages and disadvantages of the methods of crossing the gap; a punt, a pontoon bridge or a suspension bridge. However, the punt was the chosen option.

A punt was built by convict labour at Port Arthur, moved to the site to cross the remaining gap of 340m of the Derwent. The punt was winched by cables across the gap. As well as providing a much safer crossing; rowing and sailing vessels of the time could travel up the Derwent River as far as New Norfolk.

1849 BRIDGE No1 - TIMBER ROLLING SPAN ROAD BRIDGE

Following an Act of Parliament in 1846 a contract for a bridge was awarded to Thomson and Blackburn in November 1847 with construction commencing in January 1848 and finished in April 1849. Timber was sourced from Mount Dromedary, several kilometres away and brought to the site for piles and a timber truss span rolling section. 363 piles were obtained, many of them measuring from 18m to 27m, presenting a formidable problem of pile driving. The truss was 23m long, supported on iron wheels and iron rails, and operated by hand winches. Additional support was provided to the rolling span by a central tower with chains at either end of the rolling section. This provided a clear opening of 11m permitting both masted vessels and steam ships to pass through. Bridge tolls were collected in 1849 until 1880, with a tollhouse surviving until construction of the current bridge (Bridge No4) in the 1940s.

30 years after construction, Bridge No1 was still operating as the only road link across the Derwent but was in very poor condition and proclaimed unsafe in 1888 but it was a further five years before the construction of the new road bridge was completed. Bridge No1 was finally demolished in 1899.

1874 BRIDGE No2 - SWING SPAN RAIL BRIDGE

With the introduction of rail in the 1870s, a connection between Hobart and the north was important. The causeway was widened on the eastern (downstream) side to accommodate the rail track and bridge. Construction began in 1869 with the rail deviating east from the causeway ending some 15m downstream from the road bridge abutment on the northern bank.

The movable part for the rail bridge was a swing span of steel lattice girder that was sourced from England. The swing span section was also operated by hand winches.

In consideration of the types of vessels navigating the river at the time, a tow path was constructed to assist in guiding the boats between the two bridges.

The rail bridge was completed in 1874.

1893 BRIDGE No3 - SWING SPAN ROAD BRIDGE

Despite the obvious importance of a new road bridge, the Government was slow to grant funding but finally in 1892, a tender was awarded to Wishart and Son, an experienced building contractor from South Australia, for the construction of a swing span road bridge over the Derwent River.

The new road bridge extended straight out from the causeway while the current bridge ran eastward (downstream). The swing span was manufactured in England with Bridge No3 being completed in 1893. Although originally needed as a road bridge, the bridge was also designed for conversion to rail.

The riveted steel, concrete filled caisson and turntable that carried the heavily constructed plate girder swing span is still visible today.

BRIDGE CONVERSIONS

The plan to convert the 1993 road bridge to rail was only feasible if the original 1849 road bridge could still carry road traffic and was retained thus until 1899.

By 1905 the 1874 rail bridge was over 30 years old and itself in poor condition and its replacement was necessary.

The only available option was to finally convert the 1893 road bridge to combined road-rail operation. Works to further widen of the causeway were completed in 1907, with the rails set at road level and gates installed to control traffic. The first train steamed onto the bridge in 1908. This arrangement was very inefficient for both road and rail traffic and in addition very unpopular and hazardous. Road traffic delays were compounded by the opening of the bridge as well for river traffic. The public demanded that the old rail bridge be converted to lighter road use. Subsequently, the 1874 rail bridge was refurbished, converted and opened to road traffic in 1908 and once again exceeded its expected life span, eventually surviving nearly 70 years, before demolition in 1942.

The 1893 bridge was demolished once the rail crossing on the current bridge was completed in 1946 after more than 50 years of service. The swing span girders, at 120 years of age, are still in service on a currently disused rail bridge over the Brooker Highway at Derwent Park.

1946 BRIDGE No4 – LIFT SPAN ROAD & RAIL BRIDGE

The current Bridgewater Bridge (No4) construction commenced in 1938 but was halted during the Second World War, with the bridge opening to limited road traffic in 1942. The full deck was completed in 1944, the lift span in August 1946 and the rail crossing in October 1946. River navigation through the misaligned spans of the three bridges during construction was difficult, so two of the redundant bridges were demolished to aid navigation.

The electric welding process had not been used greatly for structural purposes in bridges, although some understanding of welded steel bridges and metal fatigue was already developing. Designer and Chief Engineer for the Public Works Department, Allan Knight, was determined to consider weld fatigue in the design of the all-welded bridge structure. He engaged David Issacs, an engineering consultant from Victoria, to assist with the design. Isaacs opted for the use of butt welds, especially where the welds were to be flush-ground and located in thick metal where accurate alignment of the members was possible on opposite sides of the weld.

The bridge is supported by reinforced concrete piers on concrete encased timber piles with the piers supporting the lift span towers constructed on reinforced concrete caissons. There are eleven welded plate girder with a concrete deck, two on the northern approach of the three steel truss spans and nine on the southern side. The lift span and flanking spans at either end are of strong, stiff and lightweight truss construction. All three are through trusses that these days constrain the dimensions of road and rail vehicles travelling over the bridge.[Figure 13] The 42.9m lift span has had a number of decking changes, initially a light weight Oregon timber deck, with the current system comprising vertically oriented planks compressed together into a monolithic slab using transverse post tensioning. The waterway opening has a clear distance of 36.5m between piers.

The heavy lift span is counterbalanced with two large concrete counterweights, with each counterweight supported by six 44mm wire ropes at each of its two ends and each group passing over a large diameter cast sheave with two grooved sheaves mounted on top of each tower. The sheaves support the combined mass of both the lift span and its counterweights. The necessary drive was originally provided from a side valve V8 petrol engine, with lever operated brakes and manually operated rail locks. This system was later changed to twin wound rotor electric motors with a diesel engine backup.

The bridge now carries some 20,000 vehicles per day, with 10 per cent of commercial vehicles, and a regular and rigorous maintenance regime is followed with daily inspections of the critical components such as counterweight and operating cables. The bridge has also seen significant strengthening and rectification works over the last 40 years, including structural modifications to increase the load capacity, the strengthening of piers with transverse steel beams encased in concrete and improved reliability of the lift span.

Tasmania is still waiting for the funding for replacement of a new bridge. A major scoping refurbishment project was commenced in 2007 with the aim of maintaining the current bridge for a maximum of 15 years.

HERITAGE SIGNIFICANCE

There are a number of heritage significant items in the Bridgewater and Granton Derwent River precinct still visible of former bridges, the convict built causeway, the 'Old Watch House' and along with the current bridge, many are registered on the National Heritage List and the Tasmanian Heritage Register. Elements such as stone abutments from the 1874 swing bridge and the caisson and turntable from the 1893 swing bridge are clearly visible and in reasonable condition. [Figure 13]

The current bridge is recognised for its engineering design process adopted by Allan Knight, the Tasmanian Government's desire to assist economic growth and the development of paper manufacture in the Derwent Valley. It is considered reminiscent of a previous era of river transport.

Bridgewater Bridge must obviously be retained in a safe and reliable condition on the Midland Highway, to link Hobart with Tasmania's northern cities and ports, until it can be replaced by a structure offering a higher level of service. Beyond its critical transport function, even if it were not significant at a national level, it remains important in the Tasmanian heritage context.

Being relatively old, large and rare, displaying particular examples of engineering ingenuity, having an association with prominent individuals and fitting within a heritage landscape justify the heritage status of the bridge. Retaining and maintaining the bridge in its later years as a piece of secondary infrastructure once replaced by a modern highway bridge will, however, pose considerable challenges, some of which may yet be insurmountable. Options may exist for retaining the bridge as a non-active structure.

ASSESSMENT of SIGNIFICANCE

Historical Significance

- Derwent River was a major obstacle for the transport of people and freight in early Tasmania. At the Bridgewater crossing the river is 1km wide.
- The causeway construction commenced on the southern bank in 1830 and was completed in 1836. This is one of the largest convict-built engineering works in Australia. The causeway was built obliquely across the river to a length of 730m (2400ft) with a ferry crossing filling the gap.
- The first bridge, replacing the ferry, was completed in 1849 but then followed Bridge No2 (1874) the Tasmanian Main Line Railway Company Bridge, Bridge No3 (1893) road bridge and finally Bridge No 4 (1947) a combined road and rail bridge that operates today.
- The Bridgewater Bridge and causeway provides the crossing of the Midland Highway (Tasmania's National Highway No 1) over the Derwent River.
- The current Bridgewater Bridge is the largest surviving lift span bridge in Australia and the only one of its kind in Tasmania.
- The current Bridge may well be the oldest all-welded railway truss bridge and oldest all-welded railway lift span existing in the world.

Historical Individuals and Associations

O'CONNOR, Roderick (1784-1860) was born in Galway, Ireland, and grew up on his father's land holding and gained experience as a practical engineer with bridges, weirs and farm buildings. Having considerable capital, he left Britain in his own ship *Ardent* and arrived in Van Diemen's Land along with his two sons, William and Arthur. He received a free grant of 1000 acres (405ha) on the Lake River. Governor Arthur chose O'Connor as his 3rd Commissioner of Survey and Valuation. When his field work as commissioner was ended, O'Connor was made Inspector of Roads and Bridges, a post that gave him control of hundreds of convicts on public works and other projects. One of his major projects was the Bridgewater causeway, as well as 'nearly all the finished parts of the Roads in this Colony'. O'Connor left public life when Arthur's governorship came to an end in 1836.

LEE ARCHER, John (1791-1852) architect and engineer, was the only son of John Archer, also an engineer of County Tipperary and Dublin, Ireland. Lee Archer trained in London in the offices of Charles Beazley, architect, and John Rennie, engineer. Appointed by Earl Bathurst to the position of Civil Engineer in Van Diemen's Land and trusted also with duties of Colonial Architect on his arrival in August 1827. He served for eleven years and for most of that period was responsible for the design of a significant number of both military and civil works. He was responsible for a number of bridges, Ross bridge of his own design, produced drawings for bridges over the Hobart Rivulet in Harrington Street and Argyle Street and prepared a plan for the port of Hobart.

BLACKBURN, James (1803-1854) a civil engineer, surveyor and architect, was born in Upton, West Ham, Essex, England. Following extreme financial distress Blackburn forged a cheque to try and cover his losses. He was transported to Van Diemen's Land for life, arriving in Hobart Town on 14 November 1833. His wife and daughter followed, arriving in 1835. He was immediately employed in the Department of Roads and Bridges, working under Roderick O'Connor. He bought with him laudatory testimonials and was able to support petitions from leading citizens of Hobart and gain a free pardon in 1841. Blackburn entered into a partnership with another former convict, James THOMSON, designing and building a multitude of structures; buildings, churches and bridges. The first Bridgewater Bridge was planned in 1840-41 but after protracted negotiations was built in 1846-49 by the firm.

THOMSON, James Alexander (1805-1860) an architect, engineer and building contractor, a native of Haddington, Scotland. He and his brother, Joseph, were convicted and transported separately. James arrived in Hobart Town in December 1825.He was assigned to Public Works as a draftsman for David Lambe and John Lee Archer. He was granted a conditional pardon in 1835 and entered into business on his own account receiving a free pardon in 1839. He worked as an architect, engineer, surveyor, valuer and estate agent. He worked in partnership with James Blackburn on the first Bridgewater Bridge.

WISHART, John snr (1835-1906) was born in Stromness, Orkney Islands. At about 20 years of age he arrived in Victoria, Australia and worked on the goldfields, then shortly afterwards he commenced business as a contractor. In 1865, he left Victoria for South Australia. He continued his contracting business by himself and with partners carrying out a variety of large works, principally in South Australia. In 1892, the company Wishart and Son was awarded a contract in Tasmania to construct the swing span road bridge over the Derwent River (£16,498 10s 10d)[1] as well as the Mount Cameron water race. The work for the road and rail bridge was completed in September 1893.

KNIGHT, Sir Allan Walton (1910-1998) was born in Launceston, Tasmania. He graduated from the University of Tasmania in Science and Engineering. In 1932 Knight joined the Public Works Department (PWD) and by 1937 was Chief Engineer. Knight visited the United States of America and Canada, 1937 for the purpose of investigating the design, construction and operation of lift span bridges. On his return he commenced the development and design of two lift span bridges, both for the crossing of the Derwent River, the Hobart Floating Bridge (1938-1943) and the much needed new Bridgewater Bridge (1938-1946).

In 1946 Knight left the PWD to become Commissioner for Tasmania's Hydro-Electric Commission (HEC). Following the Tasman Bridge Disaster in 1975, Knight supervised reconstruction of the bridge. Knight was presented with many honours and was created a Knight Bachelor 1970.

ISAACS, David Victor (1904-1991) a Melbourne based Consulting Engineer, was engaged by the Public Works Department, Tasmania, as a specialist consultant on the relatively new electric welding process that had not been used a great deal on steel bridge structures.

Creative and Technical Achievement

The Bridgewater Causeway was one of Australia's largest convict projects and one of the most expensive. In 1850, the causeway was estimated to contain 1,800,000 tons of stone and clay and cost the British government £53,000. The project achieved an appropriate result by providing a solid base for the causeway and is still sound to this day.

Sourcing timber for the first bridge over the Derwent River was a significant achievement in the early days of the young colonial settlement, with timber from Mount Dromedary being hauled some seven kilometres to the site for beams and piles. The most ingenious element of the bridge was its rolling span timber structure to permit ships to pass through the channel.

The current Bridgewater Bridge is the largest surviving lift span bridge in Australia and the only one of its kind in Tasmania. This bridge may well be the oldest all-welded railway truss bridge and oldest all-welded railway lift span existing in the world.

Allan Knight's decision to go for an all-welded bridge structure and his consideration of weld fatigue in the design has shown some 70 years of safety with the welding. His consultant, David Isaacs, opted for the use of butt welds, especially where the welds were to be flush-ground and located in thick metal.

Research Potential

Further research is needed to confirm the current Bridgewater Bridge as the world's oldest all-welded railway truss bridge and oldest all-welded railway lift span existing in the world.

Social

In early Van Diemen's Land, the only way to span the broad reaches of the Derwent River to reach the northern interior and its fertile pastures was by ferry. The decision to commence the construction of the causeway and eventually a series of both road and rail bridges was of great significance to early Van Diemen's Land providing passenger and freight transport link between the south and north. This benefit has continued to this day.

[1] *Mercury* Monday 25 January 1892, p

Rarity

- The Bridgewater Causeway was one of Australia's largest convict projects and one of the most expensive. Work commenced in 1830, using up to 280 convicts at one time on the site, hand quarrying the stone and then transporting the stone by wheel barrow.
- The first bridge to cross the gap between the causeway and the northern banks of the Derwent River was designed and constructed by Thomson and Blackburn, both convicts that received conditional pardons a few years after their arrival. Work began in 1846, with timber for piles and superstructure sourced from Mt Dromedary some seven kilometres away from the bridge site, also using convict labour. Chutes were built for the timber trunks to slide down from the Mount to the Derwent and floated up to the construction site.
- The current Bridgewater Bridge is the largest surviving lift span bridge in Australia and the only one of its kind in Tasmania.
- The current Bridgewater Bridge may well be the oldest all-welded railway truss bridge and oldest all-welded railway lift span existing in the world.

Representativeness

- The current Bridgewater Bridge is the largest surviving lift span bridge in Australia and the only one of its kind in Tasmania. It has survived for over 70 years and is expected to continue for some 10 years following a recent refurbishment project in 2012.
- The current Bridgewater Bridge may well be the oldest all-welded railway truss bridge and oldest all-welded railway lift span existing in the world.

Integrity/Intactness

This is covered in the assessment criteria in the items stated above.

Statement of Significance

In early Van Diemen's Land crossing the Derwent River was a major obstacle for transportation of people and freight. Ferry or boat was the only option, both difficult and dangerous, but operated thus for some 30 years.

In 1830, convict labour was used to construct a causeway from the southern bank to meet the fast flowing channel near the northern bank. Stone was quarried close to the site then the load was barrowed and dumped on the river mud flats. The work was so harsh and enduring that convicts were replaced every nine to twelve months. The project was one of the largest and expensive convict projects in Australia at that time.

Bridge No. 1 was designed and constructed by two early convicts, Alexander Thomson and James Blackburn, with construction completed in 1849. The bridge had a timber truss rolling span with iron wheels and rail that provided access when open for vessels to pass through the gap. Timber for the piles and truss span was sourced at Mount Dromedary some several kilometres away. The truss was supported by iron wheels and iron rails and operated by hand winches.

Bridge No. 2 was a swing span rail bridge built in 1874. This bridge provided rail access over the Derwent River, following the growth of railways in Tasmania. Construction began in 1869 with the rail deviating east from the causeway ending some 15m downstream from the road bridge on the northern bank. The movable part for the rail bridge was a swing span of steel lattice girder, sourced from England.

Bridge No. 3 had a steel swing span structure manufactured in England. Construction completed in 1893. The new road bridge extended straight out from the causeway. Although originally needed as a road bridge it was designed for conversion to rail.

Bridge No. 4 was commenced in 1938 but was halted during WW2 with the bridge open to road traffic in 1942. The full deck was completed in 1944, the lift span in 1946 and rail crossing completed two months later. The bridge was designed and supervised by Public Works Department Chief Engineer, Allan Knight. The all-welded steel lift span and truss Bridgewater Bridge is still in service today.

Area of Significance

The Bridgewater Bridge and Causeway warrants a National Heritage Marker but may well warrant an International Heritage Marker because it may be the oldest all-welded railway bridge and lift span structure.

INTERPRETATION PLAN

Interpretation Plan Title: BRIDGEWATER BRIDGE and CAUSEWAY, TASMANIA

Themes for interpretation

1. Construction of the Causeway and ferry
2. Construction of the Bridge No1, Bridge No2, Bridge No3
3. Construction and refurbishment of the 70 year plus Bridge No4
4. Relevant people who were designing and building the bridges

Interpretation panel locations

There are two municipalities, Derwent Valley and Brighton, and the intention is to have two Interpretation Panels, one on the southern bank and the other on the northern bank downstream of the Bridge.

1. Derwent Valley Council

It is proposed to have one Panel on the southern side of the Derwent in the Granton car park area, which is on the western side of the Causeway near the 'Old Watch House'. There is a Community Hall between the 'Old Watch House' and car park available for the Ceremony and following refreshments. Proposed location is to be confirmed.

Old convict 'Watch House' with quarry behind
[Ian D Cooper]

Community Hall
[Ian D Cooper]

Panel site option
[Ian D Cooper]

Aerial view of Watch House, Community Hall, car park/playground with quarry in background

2. Brighton Council

The northern shore (Brighton area) option is favoured to be on the eastern side of the Bridge in an area which has easy access for parking and viewing the panel, the bridge and the river. Proposed location is to be confirmed.

Northern bank East side of Bridge
[Ian D Cooper]

Northern bank West side of Bridge
[Ian D Cooper]

REFERENCES

Books

HAWLEY STANCOMBE, G. (1968) “Highway in Van Diemen’s Land” Halstead Press, Sydney

KNIGHT, A. W. (1937) “An Investigation of the Design, Construction and Operation of Lift Bridges in the United States of America and Canada in 1937” Department of Public Works, Tasmania

NEWITT, Lyn (1988) “Convicts & Carriageways” Department of Main Roads, Tasmania

SMITH, Roy (1962) “John Lee Archer” Foot and Playsted, Launceston

SMITH, Roy (1969) “Early Tasmanian Bridges” Foot and Playsted, Launceston

WHITHAM, Lindsay (2002) “Railways, Mines, Pubs and People” Tasmanian Historical Research Association

Papers

FOWLER, Andrew, “River Derwent, Tasmania – Bridgewater Bridges – Past and Present” 16th Engineering Heritage Australia Conference, Hobart, November 2011

ISAACS, David, “Design of Welded Steelwork in Bridgewater Bridge, Tasmania” Transactions of the Institution of Engineers, Australia, Vol. XX11, Dec 1941

JORDAN, J. William (Bill), “Bridgewater Crossing of the Derwent River Heritage Significance Assessment and Conservation Planning – Discussion Paper” February 2002

KAY, William Porden, “On the Construction of the Bridge and Causeway across the River Derwent at Bridgewater, in Tasmania” Royal Society Proceedings Vol 1, (1851) pp214-218

O’CONNOR, C., “Bridge and causeway engineering Bridgewater heritage assessment”, 1997

Other referenced sources

Australian National University Library

Tasmanian Archives Heritage Office

Various newspaper articles from *Examiner, The Courier, The Mercury*

IMAGES

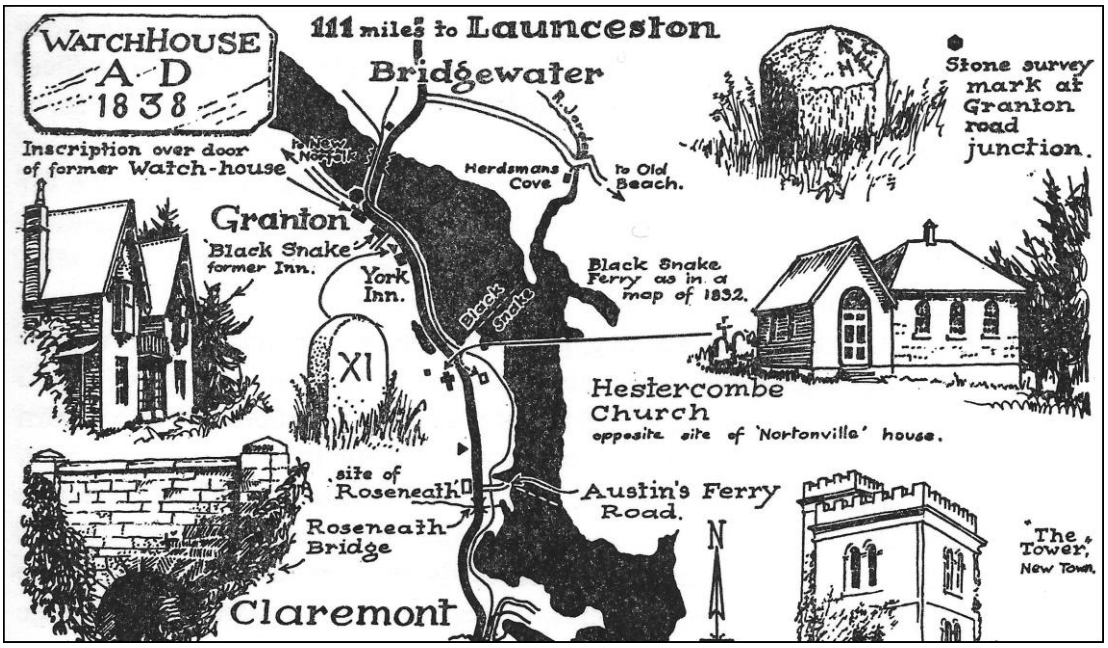


Figure 3 Showing early ferry locations
[Illustration by Eric Ratcliff]

Figure 4 View from south of Causeway 1840
[Tasmanian Museum & Art Gallery (TMAG)]

Figure 5 View of Causeway c1870
[Tasmanian Archives & Heritage Office (TAHO)]

Figure 6 Bridge No1 c1860 with rolling span [TAHO]

Figure 7 Bridge No2 rail bridge in foreground with swing span open and Bridge No1 in the background [TAHO]

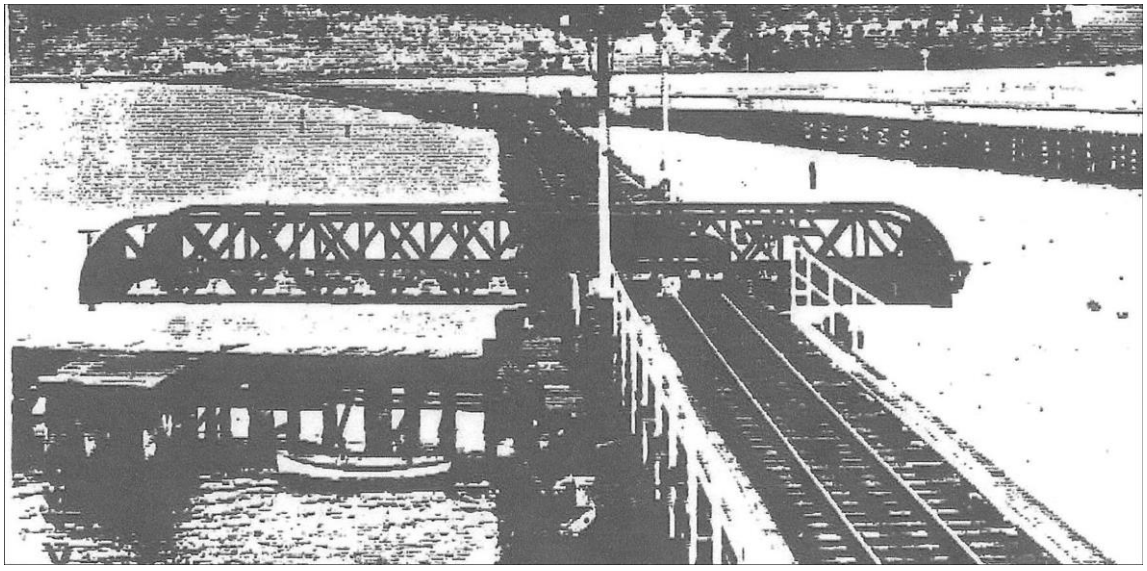


Figure 8 Bridge No2 showing asymmetrical span of the rail bridge opened and also showing part of the 1893 road bridge on the right [Tasmanian Mail 18/01/1908 edited]

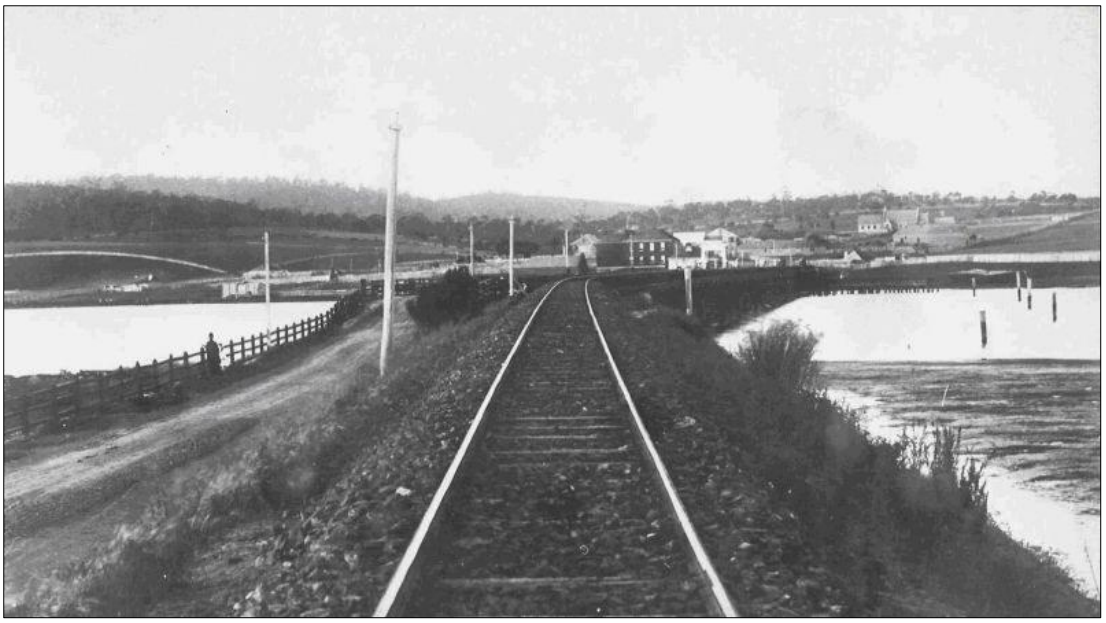


Figure 9 Causeway view looking north along the 1874 rail bridge c1870 [TAHO]

Figure 10 Ferry boat heading upstream showing Bridge No 3 rail swing bridge c1900 [TAHO]

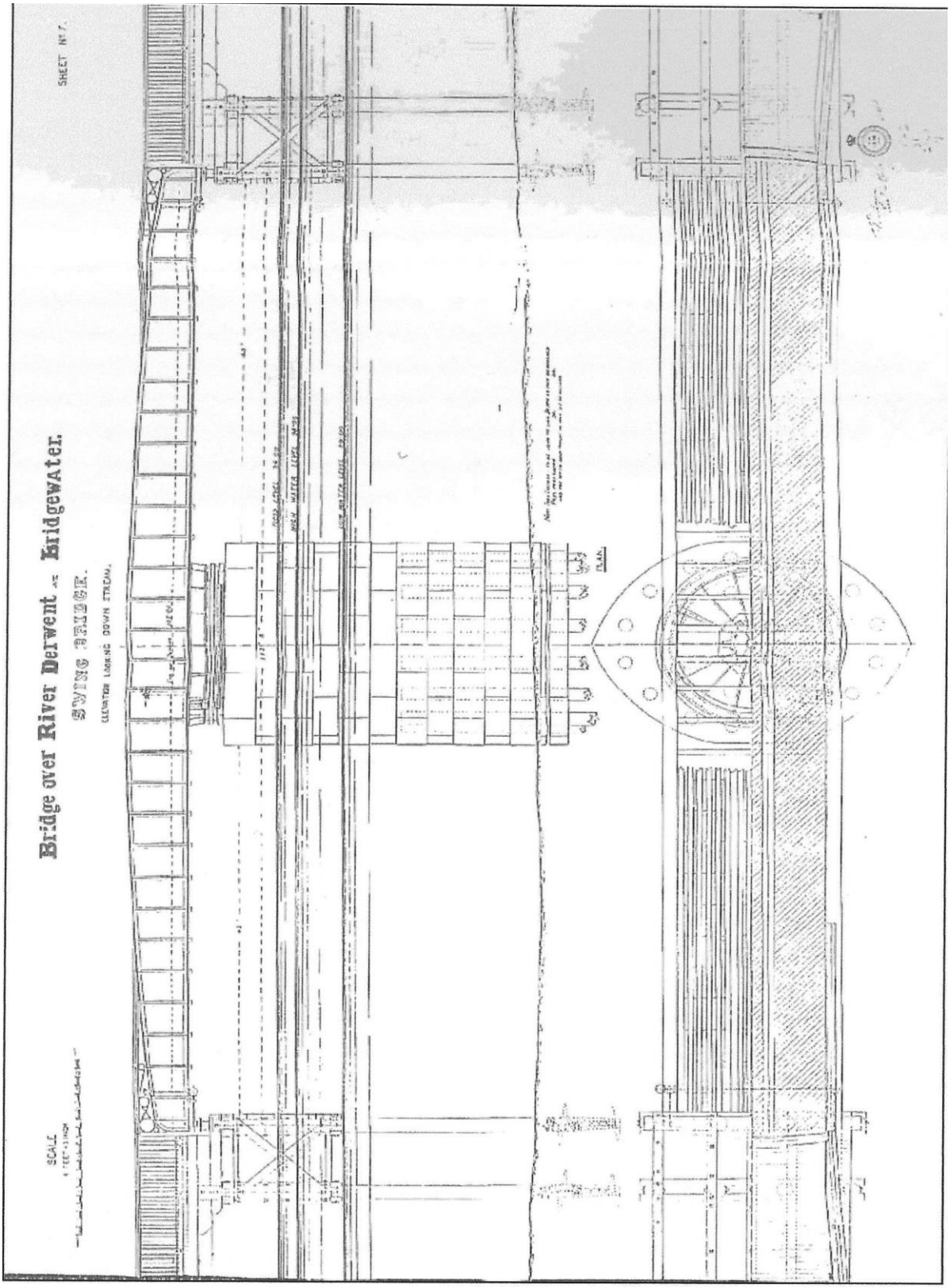


Figure 11 General Arrangement of 1993 rail bridge [TAHO]

Figure 12 Current Bridgewater Bridge with lift span elevated [Ian D Cooper]

Figure 13 Showing lift span, its two approach truss spans, the two northern steel girder spans and the nine southern approach girders. The heritage listed stone abutments of the 1874 rail swing bridge and the caisson of the 1893 road/rail swing bridge [Ian D Cooper]

BIOGRAPHIES

O'CONNOR, Roderic (1784–1860) by P. R. Eldershaw

Roderic O'Connor (1784-1860), public servant and landowner, was the son of Roger O'Connor and his first wife Louisa Anna, née Strachan. His father, descendant of a rich London merchant, was an eccentric Irish landowner whose sympathies veered from suppression of agricultural rioters to support of United Irishmen; by a second marriage he had two notable sons: Feargus, who became an erratic leader of English Chartists, and Francis, who won high military and political rank in Bolivia.

O'Connor's motives for emigrating to Van Diemen's Land can only be guessed, but the fact that he brought with him in his own ship *Ardent* his natural sons William and Arthur (Rattigan) may give the clue. They arrived in May 1824 and O'Connor, who had considerable capital, received a free 1000-acre (405 ha) grant on the Lake River. Here his experiences on his father's land and as a practical engineer were not wasted; bridges, weirs and farm buildings were among his early improvements. He lost no opportunity to increase his estate either by free grant or by shrewd purchase and in four years had trebled it.

Lieutenant-Governor (Sir) George Arthur, whose patronage and protection O'Connor was many times to enjoy, chose him to be third commissioner of survey and valuation. The commission had been set up in consequence of the British government's instructions to have the colony divided into counties, hundreds and parishes, and to have the waste lands of the Crown valued for purposes of levying quitrent; Arthur used them for many other purposes, such as reporting on the suitability of areas for towns, and surveying harbour facilities and the route for a north-south road.

O'Connor's journals point to the conclusion that he was the commission's most active member; in company with Peter Murdoch between 1826 and 1828 he examined all the settled districts of the island; what he saw is recorded in vivid and uncomplicated language that goes far beyond the usual limits of official reports. The journals give an entertaining picture of the landed community, exposing various stratagems to defraud the government of land and other assets, describing farming methods and improvements, recalling the humble and sometimes disreputable beginnings of many of the wealthy people and fulminating against the unrighteous. They reflect a hot-tempered, outspoken, worldly-wise, contentious and egotistical Irish personality, but one possessed of wit and commonsense.

When his field work as commissioner ended, O'Connor was made inspector of roads and bridges, a post which gave him control of many hundreds of convicts on public works and put several major projects in his charge; these included the new wharf in Hobart Town, the Bridgewater causeway, as well as 'nearly all the finished parts of the Roads in this Colony'. He was also a magistrate and a member of the board for investigating disputed claims to land.

O'Connor left active public life when Arthur's governorship came to an end in 1836. But his many quarrels with officials and others, aired both in the courts and the press, insured him a place in the public eye; libel cases and lengthy and vigorous exchanges with his opponents in the newspapers, in one section of which he was influential lent colour to his position as one of the largest landed proprietors in the colony. Lady Jane Franklin told her sister that he was 'a man of immense estate … bound by ties of I know not what nature to the Arthur faction … but … a man of blasted reputation, of exceedingly immoral conduct and of viperous tongue and pen'. A large employer of convict labour on his estates, O'Connor was also from personal conviction solidly opposed to the anti-transportationists; this attitude probably influenced Lieutenant-Governors Sir Early-Wilmot and Sir William Denison in nominating him for two terms, 1844-48 and 1852-53, in the Legislative Council.

The son of a professed atheist, O'Connor turned to the Roman Catholic Church very late in life; in the year of his death he gave it £10,000 for a cathedral in Hobart. In old age his irascibility became notorious, as from his Benham estate the 'red-hot Irishman' quarrelled with his neighbours and waged war on the local road trust. When he died in July 1860, he owned eleven properties totalling 65,000 acres (26,305 ha) and had 10,000 acres (4047 ha) of leasehold. William had died in 1855 and Arthur inherited the estate.

Citation details

P. R. Eldershaw, 'O'Connor, Roderic (1784–1860)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, http://adb.anu.edu.au/biography/oconnor-roderic-2518/text3407, published first in hardcopy 1967, accessed online 21 February 2018.

BLACKBURN, James (1803–1854) by Harley Preston

James Blackburn (1803-1854), civil engineer, surveyor and architect, was born in Upton, West Ham, Essex, England, the son of John Blackburn, a liveryman of the Haberdashers' Company and partner in a firm of scale-makers at Shoreditch, and Anne, née Hems. One brother, Isaac, succeeded his father in the profession, while another, John, ordained in the Independent Church, became its pioneer statistician.

Blackburn married Rachel Hems in 1826. In 1833, when employed as an inspector for the commissioners of sewers for the London districts of Holborn and Finsbury, extreme financial distress caused by the failure of a private building speculation, and the threatened resumption of his possessions, led to the forgery of a cheque for £600 on the Bank of England in the names of his employers. Despite highly commendatory testimonials to character, including those of the commissioners, Blackburn was sentenced at the Old Bailey on 20 May 1833 to transportation for life. He arrived at Hobart Town in the *Isabella* on 14 November, and his wife and daughter arrived in the *Augustus Caesar* on 31 October 1835. He was immediately employed in the Department of Roads and Bridges, under Roderic O'Connor in 1833-36 and Alexander Cheyne in 1836-39.

He had brought with him laudatory testimonials and in 1836 and 1839 was able to support petitions for a free pardon with a remarkable collection of encomiums from leading citizens of Hobart, who praised his character and diligence. In 1839 the Department of Public Works was created to combine the functions of the Department of Roads and Bridges, the civil engineer and the colonial architect. Cheyne and Blackburn formed the nucleus of the new department and indeed Blackburn's many and varied projects, appearing over Cheyne's signature, occasioned its formation, for Cheyne was untrained in most of its duties. From 1833 to 1839 a very large part of the island's road-making, surveying and engineering work, excluding certain items in the convict and military establishments, was performed by Blackburn.

The year 1837 saw designs of greater stylistic interest than before. From 1839 onwards the bulk of the architectural requirements and bridges, in addition to vastly increased surveying and engineering schemes are attributable to Blackburn. His free pardon on 3 May 1841 was followed by the dismissal of Cheyne.

Blackburn, who had received unusual authority and responsibility for a convict, entered into partnership in private practice with another former convict James Thomson and was the successful contractor for works designed in servitude ranging from the tiny picturesque Tudor lodges (actually a watch-house) at St John's, New Town (1841-42) to the mammoth and grandiose classicist Government House designed for the Franklins (1840, abandoned 1843 and demolished). A pontoon bridge at Risdon designed in 1841 was unrealized, but the Bridgewater Bridge planned in 1840-41 was, after protracted negotiations, built by the firm in 1846-49. Many other important post-depression engineering projects remained unfulfilled. Among them were a scrupulously organized water supply for Hobart (1841-43), for which Blackburn was employed by Charles Swanston; a ferry or punt for the Derwent (1845-46); irrigation schemes for the Midlands; and various road improvements. Blackburn acquired land at Campbell Town, which from 1843 became increasingly the main centre of his activities. From 1844 he was tenant at Camelford, and later engaged in flour-milling on the Elizabeth River when private commissions were scarce and his funds were low. On 16 April 1849 he and his family sailed in the *Shamrock* for Melbourne, where he immediately set up practice as engineer and architect. That year he formed a company to sell filtered and purified water to the public, attempted to form another to mine coal at Western Port, and carried out some minor architectural commissions. On 24 October he was appointed city surveyor, and in 1850-51 produced his greatest non-architectural work, the basic design and fundamental conception of the Melbourne water supply from the Yan Yean reservoir via the Plenty River. Despite his original vision, the plans were carried out, somewhat modified, with Blackburn in a subordinate position. He was injured in a fall from a horse in January 1852, died on 3 March 1854 at Brunswick Street, Collingwood, of typhoid and was buried as a member of the Fitzroy Church of England. Of his ten children all except two were born in Australia; only five children survived him. His eldest son, James, followed his profession.

Although Blackburn's life was predominantly one of unrealized potentialities, he has claims to be considered one of the greatest engineers of his period in Australia, and his architectural achievements established him as Tasmania's most advanced and original architect.

Stylistically the masterpiece of Blackburn's Gothic work, which looks forward to the Gothic Revival of the next decade, is Holy Trinity, Hobart (1840-47). Smaller examples range from St Matthew's, Rokeby (1839-41), the naves of St Andrew's, Westbury (1840-42) and old Holy Trinity, Launceston (1841-42, demolished) to those attributed by the writer such as the unfinished St Mary's, Kempton (1838-44) and the minuscule Congregational Chapels at Bagdad (1842, now mutilated) and Cambridge (1842-43). The Port Arthur church (1836-41) has no connexion with him. Of outstanding importance in the history of Australian architecture are three Romanesque or Neo-Norman works which mark one of the earliest colonial appearances of the style, being all designed in 1839 and built within four years: St Mark's, Pontville; St Matthew's, Glenorchy, Sorell Presbyterian Church and its near repetition, the former St Andrew's, Evandale. This unique style was modified into an Italian villa variant as early as the Glenorchy watch-house (1837-38, demolished), Spring Hill watch-house (1839-40), Longford gaol (1839-42, mostly demolished), the

important and picturesque New Town Congregational Church (1842-45) and imposing additions to Rosedale, Campbell Town (1848-50). Blackburn was the foremost, although not the earliest, exponent of Greek Revival forms in Tasmania in the Lady Franklin Museum (1842-43) and the Public Offices portico, Hobart (1841-42). St George's, Battery Point, an aggregate from four architectural hands, is dominated by Blackburn's tower and vestries (1841-47) where its Regency Greek manner is under slight Egyptianizing influence in conformity with John Lee Archer's nave (1836-38). Further picturesque Tudor works are old Trinity rectory, Hobart (1840-42), designs (unbuilt) for a public school in Hobart (1839) and the proposed New Norfolk College (1841), and for Dr William Valentine at Campbell Town, The Grange (c.1848-49). Besides many ambitious alternative plans in a variety of styles for Lady Franklin's Government House, there are many attributions by the present writer and innumerable routine and minor public buildings, for example the 'gothic' watch-house, now the Bellerive Library (1841-42, much altered), all of which indicate, even when they were not supervised by Blackburn, his technical proficiency, resourcefulness and fecundity of imagination as a designer.

Select Bibliography

- R. C. Seeger, 'The History of Melbourne's Water Supply-Part 1', *Victorian Historical Magazine*, vol 19, no 3, June 1942, pp 107-119 and vol 19, no 4, Dec 1942, pp 133-38
- R. C. Seeger, 'The History of Melbourne's Water Supply-Part 2', *Victorian Historical Magazine*, vol 22, no 1, June 1947, pp 23-47
- H. Preston, 'The Life and Work of James Blackburn' (manuscript, privately held).

Citation details

Harley Preston, 'Blackburn, James (1803–1854)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, http://adb.anu.edu.au/biography/blackburn-james-1789/text2019, published first in hardcopy 1966, accessed online 21 February 2018.

THOMSON, James Alexander (1805–1860) by Harley Preston

James Alexander Thomson (1805-1860), architect, engineer and building contractor, was a native of Haddington, Scotland, and at 20, as 'a wild but clever young man', was transported to Van Diemen's Land for theft. With his brothers William and Joseph he had been discovered in a private house, and the three were tried together for the same offence and sentenced on 18 February 1824. William was considered less culpable and pardoned after imprisonment in Newgate; Joseph and James were transported separately; Joseph, who identified the object of the theft as jewellery to the value of £3000, was drowned after two years in the colony. James, who arrived at Hobart Town in the *Medway* on 14 December 1825, was assigned to public works and was frequently on loan to the colonial architect, David Lambe, and his successor, John Lee Archer, both of whom professed satisfaction with his work as draughtsman. Archer procured for him a small remuneration and towards the end of his assignment he was superintendent of the church building at Richmond (St Luke's 1834-37). He had also acted from 1830 as overseer of the government plumbers, glaziers and painters; indeed his trade was given in convict records as decorative painter. These records imply that at the date of transportation he had a wife and child living in Park Street, Regent's Park, London. By 3 June 1830, however, he had petitioned the lieutenant-governor for permission to marry Eliza Ogilvie, the comfortably endowed widow of a respectable Hobart wine and spirits merchant who had died in 1828 leaving her with three children. A daughter, Alice, appears to have been born on 7 August 1830, although the marriage at Richmond did not take place until 16 October 1832. A son, William, was born on 13 August 1833. By 1859 only one daughter, Fanny, survived, but two sons were living.

Thomson received a conditional pardon on the Ist January 1835 and immediately set up a business in Liverpool Street, which lasted for most of his life, not only as architect, engineer and surveyor, but also as valuer, estate agent, map printer and dealer in machinery. His free pardon became effective on 31 July 1839. Despite his several complaints that officers of the Royal Engineers and public servants used their leisure time in architectural activities and caused unfair competition, Thomson seems to have enjoyed reasonably consistent architectural patronage, particularly during the shortage of architects in the 1840s. In 1841 he was a partner of James Blackburn in at least some contracts, though both worked independently as well. Thomson was also one of the first in Hobart to become interested in lithography both in its artistic and in its commercially reproductive applications. In 1850-51 Thomson had been one of the first to seek gold in Tasmania, investigating without success Frenchman's Cap and other areas. On 5 December 1852 his wife Eliza died, aged 51, and on 6 December 1853 Thomson married Catherine, the widow of the Hobart builder, John Jackson. Thomson moved from Liverpool Street to Elboden Street and later to Melrose in Hampden Road. He owned property in Macquarie Street, and worked professionally from the Stone Buildings later, about 1855-56 operating there under the name of Thomson & Cookney.

In 1853 he yielded to the supplications of a large group of supporters to stand as an alderman on the Municipal Council, a position he held until 1857. One of his great concerns was the Hobart water supply. Architecturally the bulk of Thomson's work appears to be in the domestic context: the designing and sometimes building of workmanlike utilitarian structures such as shops, office buildings, terraces and houses and cottages, none being works of paramount importance. One interesting tender let in 1850 was for fifty timber-framed houses for the Californian goldfields. Thomson was also engaged in contracting for jetties, wharves and harbour improvements in Hobart and, with Blackburn, road-making. His spectacular buildings were few. Unquestionably the most interesting and important work is the Hobart Synagogue (1843-45), the most comprehensive example of the Regency Egyptian style in Australia (felt suitable for this religion), surpassing in quality the first synagogues of Launceston, Melbourne and Sydney. Other churches are of plain and rudimentary village Gothicism, such as St Joseph's, Hobart (1841-43, some alterations), and St Joseph's, Launceston (1838-42, demolished and replaced), little touched by the more scholarly aspects of Gothic Revivalism. A few other works are attributable. Besides the Bridgewater Bridge (1846-49, with Blackburn) Thomson's best known early work was the pile bridge across the Derwent at New Norfolk (1840-41). An association with the stone bridge at Dunrobin (built 1850-56 under William Kay's supervision) is suggested by an obituary of reserved eulogies, which lists also the bridge at Richmond (presumably reconstruction of earlier fabric), the smelting works at Exmouth Bay, the former Hobart Exchange rooms and attorney-general's offices. Thomson had a long record of devoted service as a Freemason and Lodge treasurer, and committee member of the Hobart Mechanics' Institute. He sailed in the *Isles of the South* on 3 February 1860 for a visit to England, and died of typhoid fever at Helensburgh, near Glasgow, on 15 September 1860, aged 55.

Whatever his merits as architect, and they are relatively minor, Thomson provides a remarkable case of a former convict establishing himself as a successful businessman, despite his small estate, respected in many circles and with a considerable variety of commercial activities and social interests.

Select Bibliography - *Hobart Town Advertiser*, 21 Nov 1860, Blackburn papers (privately held).

Citation details

Harley Preston, 'Thomson, James Alexander (1805–1860)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, http://adb.anu.edu.au/biography/thomson-james-alexander-2733/text3857, published first in hardcopy 1967, accessed online 21 February 2018.

KAY, William Porden (1809–1897) by Harley Preston

William Porden Kay (1809-1897), architect, surveyor, engineer and public servant, was born in England, the son of Joseph Kay (1775-1847) and grandson of the eminent architect William Porden (1755?-1822). He was trained under his father who had been a pupil of S. P. Cockerell, sometime architect to Greenwich Hospital and vice-president of the Institute of British Architects. William then went to New Brunswick to work for the New Brunswick Land Co. and for the government. As the nephew of Sir John Franklin through his first wife Eleanor Porden, Kay was invited to Van Diemen's Land because the Franklins objected that the two most highly qualified architects in Hobart Town, James Blackburn and James Thomson, were emancipated convicts.

Kay sailed from London as a cabin passenger in the convict transport *Isabella* and arrived at Hobart on 20 May 1842. Five days later he applied for the position of director of public works, lately vacated by the architecturally inept Alexander Cheyne. Amidst implications of nepotism largely unjustified, Franklin appointed Kay provisionally on 16 June, but in 1843 this was disallowed by the secretary of state, who directed that Major James Victor should have the position. In November Kay was appointed colonial architect, but both Victor and Lieutenant-Governor Sir John Eardley-Wilmot were dissatisfied, and in January 1844 Kay was restored to his position as director of public works. In September the Colonial Office again overruled the appointment and Kay resumed duty as colonial architect and surveyor of buildings under Victor. Early in 1847 the Legislative Council deleted Kay's position from the estimates and the acting administrator, Charles La Trobe, appointed him superintendent of the King's Wharf. However, Lieutenant-Governor Sir William Denison reappointed Kay director of public works and in January 1848 gave him additional duties as director of waterworks. From 1846 to 1859 Kay served on the Bridgewater Bridge Commission, in 1850 he became a commissioner under the Market Act, and from 1855 he was director *ex officio* of the New Norfolk Bridge Co. He was given leave to return to England on half-pay from 1 March 1853 until 29 November 1854, owing to the failure of his eyesight, but otherwise remained in office until 31 December 1858. He was pensioned from 1 January 1859, and on 3 February 1860 he sailed for England in the *Isles of the South*. He died on 29 April 1897 at Tunbridge Wells.

On 3 April 1845 at St John's, New Town, Kay had married Clara Ann Elwall; a daughter, Clara Virginia Porden, was born on 19 December 1849. His wife is said to have returned to Tasmania in the 1870s to her profession as governess.

Kay's lively interest in the fine arts is indicated by his musical soirées and by his position of secretary to the second Hobart Art Exhibition in June 1846. He lived always in New Town, for some time at Barrington Lodge, now belonging to the Salvation Army, the classicist house he built about 1850 to his own designs. Over the period of Kay's employment, a varied range of activity occupied the Department of Public Works. Particularly important were the new systems of roads, and necessarily, bridges, extending further into the interior. In addition, harbour repairs and enlargements, the reconstruction of Hobart and Launceston wharves, new transport systems, coastal lighthouses, water supply extensions, river improvements and swamp reclamation are recorded.

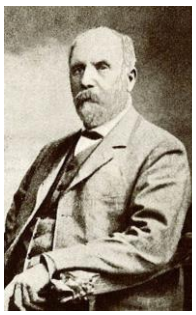
Architecturally, this post-depression period is a sparse one, and the practice of supplying church designs was practically abandoned; the simple round-arched Gala Kirk, Cranbrook (1844-45), may be an exception. Innumerable small official dwellings and offices, and particularly watch-houses were designed and built, sometimes masquerading as tiny Italian villas, ornamental cottages in Tudor or other picturesque styles; a rare surviving example is the diminutive gabled Rokeby watch-house of 1850. Generally, however, the period is noted for considerable extensions, alterations and repairs to earlier buildings, the Italianate additions projected variously between 1849 and 1855 for Government Cottage, Launceston, or the ballroom for old Government House, Hobart (1849-50), being examples. Larger commissions reveal the main styles used by Kay: the symmetrical Tudor St Mary's Hospital (1847-48, now the Department of Lands), a fine example of the Italian villa style; the harbourmaster's house and the former post office (1851, demolished); the round-arched, and monumentally classicist Hobart markets (1851-53, destroyed by fire); and, representing purely utilitarian design, the stone-quoined brick Hobart slaughter houses (1844-59). Of similar style are the addition to the Hobart Criminal Court of 1858-60 (extending John Lee Archer's Penitentiary Chapel, 1831-34) but the contemporary extensions along the Macquarie Street frontage of the Supreme Court buildings, based on Kay's conception and, in part, on his drawings, are more decoratively mid-Victorian. Indeed, Kay's work marks the end of the early phase of Colonial architecture and the full arrival of the more grandiose and ornamental Victorian manner. One of his smallest works, the Gothic Revival Eardley-Wilmot memorial of 1850, reveals his ideals as clearly as his undoubted masterpiece and largest work, Government House, Hobart (1853-58), with its elaborately picturesque massing and romantic Elizabethan-Jacobean style.

Select Bibliography

- correspondence file under W. P. Kay (Archives Office of Tasmania).

Citation details

Harley Preston, 'Kay, William Porden (1809–1897)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, http://adb.anu.edu.au/biography/kay-william-porden-2289/text2949, published first in hardcopy 1967, accessed online 17 March 2018.



John WISHART
[Cyclopaedia of Fiji]

WISHART, John snr (1835-1906) was born in Stromness, Orkney Islands. At about 20 years of age he arrived in Victoria, Australia and worked on the goldfields for some time, then shortly afterwards commencing business as a contractor. In 1865, he left Victoria for South Australia. He continued his contracting business by himself and with partners carrying out a variety of large works, principally in South Australia. His projects included the second section of the Intercolonial railway from Mount Lofty to Nairne's 22 mile (35.4km) long, railway bridges at Hamley and Morphett Street, Adelaide, and the Robinson swing bridge at Port Adelaide, as well as bridges over the Torrens, Frome, Hindmarsh and Hackney and other numerous bridges, buildings, jetties, wharves. The Company also had projects in Victoria, Western Australia and New South Wales. The Cowra Bridge in NSW was a unique structure, with 3 large spans.

In 1892, the company Wishart and Son was awarded a contract in Tasmania to construct the swing span road bridge over the Derwent River (£16,498 10s 10d)[2] as well as the Mount Cameron water race. The work for the road and rail bridge was completed in September 1893.

[2] *Mercury* Monday 25 January 1892

KNIGHT, Allan Walton (1910–98) was born in Launceston, a brilliant student who excelled at sport, he graduated from the University of Tasmania in Science and Engineering and later developed a highly successful composite beam for bridges, a bridge type still widely used today. In 1932 Knight joined the Public Works Department (PWD) and by 1937 was Chief Engineer. Knight visited the United States of America and Canada, departing Sydney on 15th October 1937 aboard the *s.s. Monterey*. The purpose of his visit was to investigate the design, construction and operation of lift span bridges. On his return he commenced the development and design of two lift span bridges, notably the Hobart Floating Bridge (1943) and the Bridgewater Bridge No4 (1946), both crossing the River Derwent.

Sir Allan KNIGHT
[TAHO PH30/1/3598]

In 1946 Knight was appointed Commissioner of the Hydro-Electric Commission. He surrounded himself with capable staff and employed many migrants to work on his new developments. Knight became one of the nation's big spenders and the Commission won international recognition for enormous advances in the technology of dam and power station design and construction. Under Knight's leadership (1946–1977) the Commission's installed capacity grew from 172 to 1515 megawatts and its workforce from 1000 to over 5000. His plans were not without controversy: the proposal to flood Lake Pedder was strongly opposed and led to Tasmania's first true environmental battle, which the Hydro eventually won.

After the Tasman Bridge disaster in 1975, Knight supervised reconstruction which, he said, was probably the biggest challenge of his professional life. Knight was presented with many honours and was created a Knight Bachelor in 1970. His sporting achievements were also impressive and he excelled in rowing, tennis and real tennis. An exceptional engineer of world standing, Knight had great vision and organising ability and made a major impact on Tasmania's development.

Further reading:
'Champions of the Hydro' *Turning point* supplement, *Mercury*, 30 June 1998; Obituary – Sir Allan Knight, Kt., CMG, FIE Aust, *Engineering Tasmania*, July 1998; *Knight Reminiscences*, THRAPP45/4, 1998

ISAACS, David Victor (1904-1991) was born in Melbourne on September 26, 1904, educated at Wesley College, went on to University of Melbourne, graduated in Engineering, gained a Masters Degree in Civil Engineering and was winner of a University medal. He became one of Australia's most distinguished civil engineers with his pioneering work on electric welding, his contribution to the recovery of gold bullion from the sunken RMS *Niagara* during World War 2 by a German mine off New Zealand in 1940 and his role as founding Director of the Commonwealth Experimental Building Station [3] from its inception in 1944 until his retirement in 1969.

David Victor ISAACS
[Isaacs family]

He was engaged by the Public Works Department, Tasmania, to work with Chief Engineer, Allan Knight as a specialist consultant on the design along with the welding process on the Derwent River's two bridges, Hobart Floating Bridge and all-welded road and railway Bridgewater Bridge.

[3] *Herald* Melbourne Monday 26 June 1944 - Appointment of a director and technical staff for the Commonwealth Government's experimental building station to be set up in Sydney was announced today by the Minister for Post- War Reconstruction (Mr Chifley). The setting up of the station was approved following recommendations based on the first report of the Commonwealth Housing Commission. The Director will be Mr D. V. Isaacs, consulting engineer, of Melbourne, who is doing special technical work for the Allied Works Council. Mr Isaacs is a Master of Civil Engineering of the University of Melbourne, Associate Member of the Institute of Civil Engineers, London, and a Member of the Institute of Civil Engineers (Aust.).